



BEST AVAILABLE COPY

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

)

Serial Number: 10/055,150

)

Examiner: Erika A. Gary

Filed: January 23, 2002

)

Group Art Unit: 2681

For: PDA ENABLED TELEPHONE

)

Inventors: Gancarcik et al.

)

Attorney Docket No.: 481340010041

05 January 2005

The Assistant Commissioner of Patents
Washington, D.C. 20231
U.S.A.

DECLARATION UNDER 37 CFR 1.131

Dear Sir:

We, Ed Gancarcik, David Ross, Jean-Marc Seguin and Alan Chamsi, whose full post office addresses are 65 Elliott Avenue, Ottawa, Ontario, Canada; 6 James Long Court, Nepean, Ontario, Canada; 73 Randall James Drive, Stittsville, Ontario, Canada; and 526 Wavell Avenue, Ottawa, Ontario, K2A 3A4 Canada, respectively, hereby declare and say as follows:

1. We are the named co-inventors of the subject matter disclosed and claimed in the above-identified patent application; namely, serial number 10/055,150 filed January 23, 2002.

2. Prior to October 31, 2000, we conceived the above-identified and claimed invention. We are aware of U.S. Patent 6,738,643 filed October 31, 2000. In order that this patent not be considered as citable prior art against the claims of the present invention we can establish a date of invention earlier than the filing date of the Harris patent which was filed October 31, 2000. As factual evidence of this, the following facts are entered with supporting

documentation.

3. Prior to October 31, 2000, we had advised corporate legal counsel for Mitel that we had invented certain novel and inventive improvements in a PDA enabled telephone for which we believed patent protection should be obtained.

4. Enclosed as Exhibit A is a letter from the Mitel Patent Administrator to our Canadian Patent Agent enclosing an Invention Disclosure (with dates partially redacted) for the technology subject of the claims of the present patent application. This invention disclosure was provided to our Canadian Patent Agent, establishing a date of conception prior to October 31, 2000.

5. Evidence proving conception of the invention before October 31, 2000 is as follows, having regard to the language of claim 1 which reads:

A personal digital assistant (PDA) enabled telephony system comprising:

[Reads on: Invention Disclosure PDA enabled telephony system (Exhibit A)]

Call control means for implementing telephony functions;

[Reads on: Invention Disclosure PDA enabled telephony system (Exhibit A) disclosing a “PBX” in Figures 1 and 2, and a “call server” in Figure 3, and described through]

a telephone set connected to said call control means and having a communication port;

[Reads on: Invention Disclosure PDA enabled telephony system (Exhibit A) disclosing a “set” in Figures 1 and 2 connected to a “PBX” and a “set” in Figure 3 connected to a “call server”. The set in Figures 1, 2 and 3 “uses IrDa, Bluetooth or RS-232 communication between the PDA and the Network Portal (the set), which inherently includes a communication port in each of the PDA and the set]

a PDA having a user interface for displaying telephony functions to a user,

[Reads on: Invention Disclosure PDA enabled telephony system (Exhibit A) disclosing such a PDA in several places (e.g. the “PDA” in Figures 2, 3 or 4, the description on pages 6 and 7,

and the “PDA application which provides a user interface for call control input for a user”, on page 11, line 6]

a detector for detecting a selected telephony function,

[Reads on: Invention Disclosure PDA enabled telephony system (Exhibit A) disclosing a conventional “pen-based input device” on page 1, line 8, and elsewhere, for “user input” to “select”, as set forth on page 6, last line]

a telephony application for determining a call command based on said selected telephony function,

[Reads on: Invention Disclosure PDA enabled telephony system (Exhibit A) disclosing in several locations, such as the paragraph bridging pages 6 and 7, a “telephony application on the PDA determines which commands should be sent to the PBX for processing”]

and a communicator for communicating said call command to said communication port;

[Reads on: Invention Disclosure PDA enabled telephony system (Exhibit A) disclosing in several location, such as on page 7, “the PDA [sends] commands... to the PBX for processing”. These commands are sent to the set (i.e. network portal) using “RS-232 serial, USB, Bluetooth or IrDA interface” or any “bi-directional serial protocol [with] bandwidth [matched] with the amount of data being transferred from the PDA ... to the set”, which “may perform some post processing of the commands from the PDA before transferring the commands to the switch”]

wherein said telephone set receives said call command and, in response, passes said selected call command to said call control means for implementing said selected telephony function.

[Reads on: Invention Disclosure PDA enabled telephony system (Exhibit A) disclosing in several places, such as on page 7, lines 5 – 7, that the set transfers the commands from the PDA to the call control means (i.e. the “switch”). As discussed on page 6, lines 8 and 9, the “switch takes action based on the command” such as setting up or terminating a call.]

6. Enclosed as Exhibit B is a version of a first draft of a patent application prepared and hand-delivered by our Canadian Patent Agent to the Mitel Patent Administrator, forwarded by the Mitel Patent Administrator to co-inventor Ed Gancarcik, marked up by Ed

Gancarcik and delivered to the Mitel Patent Administrator. The date of the marked up draft is partially redacted but is a date within four (4) months from the date of Exhibit A. The (1) preparation and forwarding of the first draft patent application from our Canadian Patent Agent to the Mitel Patent Administrator, (2) forwarding of the draft from the Mitel Patent Administrator to Ed Gancarcik, (3) revision of the draft by Ed Gancarcik, and (4) delivery of the marked-up draft to the Mitel Patent Administrator within four (4) months of the date in Exhibit A, establish diligence on our part in reducing the invention to practice. The comments and revisions by Ed Gancarcik relate to hardware aspects of the invention, and Exhibit B indicates that Ed Gancarcik deferred to co-inventor Jean-Marc Seguin for commentary and input on software architecture aspects of the invention.

7. Enclosed as Exhibit C is an email from the Mitel Patent Administrator to our Canadian Patent Agent attaching a further draft of the application revised by co-inventor Jean-Marc Seguin. The date of the email is partially redacted but is a date within two (2) months from the date of Exhibit B, thereby establishing continued diligence on our part in reducing the invention to practice. In response to the further draft of Exhibit C, our Canadian Patent Agent prepared and delivered another draft to us, which was reviewed and revised by us on December 13, 2000, attached as Exhibit D, showing our continued diligence in reducing the invention to practice.

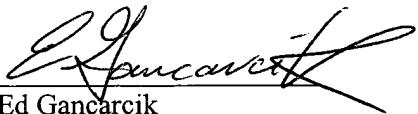
8. Our Canadian Patent Agent made further revisions to the patent application based on Exhibit D and attended to filing the application in the UK Patent Office on January 27, 2001, thereby establishing a constructive reduction to practice of the invention.

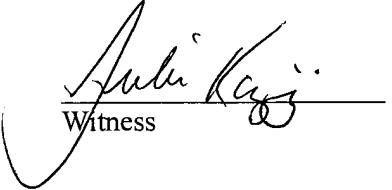
9. It is therefore respectfully submitted that the present patent application claims an invention which was conceived prior to October 31, 2000, and that we diligently reduced the invention to practice thereafter.

10. We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such wilful false statements may jeopardize the validity of

the application or any patent issued thereon.

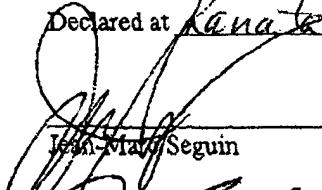
Declared at Ottawa, Ontario, Canada, the 12th day of Jan 2005.


Ed Gancarcik


Witness

6

Declared at Kanata, Ontario, Canada, the 20th day of January 2005.


Jean-Marc Seguin

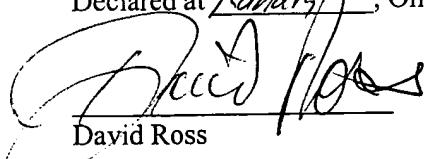

Witness

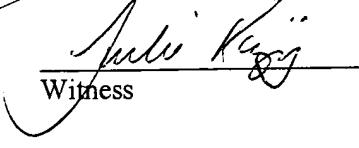
Declared at Ottawa, Ontario, Canada, the 17th day of January 2005.


ALAIN CHAMSI

Andre Charon
Witness

Declared at Kawartha, Ontario, Canada, the 17 day of January 2005.


David Ross


Witness

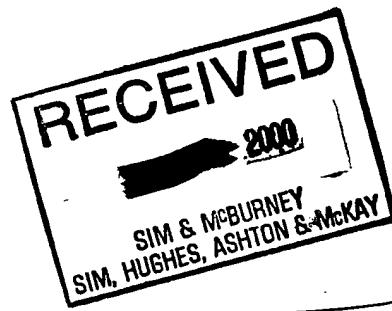
APPENDIX A



MITEL CORPORATION
350 Legget Drive
P.O. Box 13089
Kanata, Ontario
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Telephone: (613)592-2122
Fax: (613)592-4784

[REDACTED] 2000

Mr. Stephen J. Perry
Sim & McBurney
330 University Avenue, 6th Floor
Toronto, ON
MSG 1R7



18061-433

Dear Steve,

Re: New Invention Disclosure
Title: PDA Enabled Set
Inventor: Ed Gancarcik et al
Our Ref: 461 Your Ref #: TBD

Enclosed please find a new invention disclosure for the above named file.
If you have any questions or require any further information please call.

Sincerely,

Helen
Helen Richardson
Patent Administrator

Enclosure

INVENTION DISCLOSURE FORM

*Note: If a patent application has not been filed in at least one country before public showing or description of the invention, patent protection is barred in most countries of the world. Please promptly complete and submit your invention using this Form.

TO: Mitel Divisional Patent Committee Member for Inventor's Business Unit (for a list of members, contact the Divisional Patent Co-ordinator or the Mitel Legal Department in Kanata).

INTERNAL REFERENCE #: 461

Title of Invention: PDA Enabled Set
Inventor Name: (1) (Surname) Gancarcik (Given Names) Edward Peter
Home Address: 65 Elliott Avenue (Ottawa) Inventor Citizenship: Cdn
Inventor Name: (2) (Surname) Ross (Given Names) David
Home Address: 6 James Long Court (Nepean) Inventor Citizenship: Cdn
Inventor Name: (3) (Surname) Seguin (Given Names) Jean-Marc
Home Address: 73 Randall James Dr (Stittsville) Inventor Citizenship: Cdn
Inventor Name: (1) (Surname) Chamsi (Given Names) Alain
Home Address: Kanata Inventor Citizenship: Cdn

Division/Business Unit: Mitel Communication Systems

Commercial Value of Invention: Mitel products or processes which may use the invention or a third party potential licensing opportunity (if not used by Mitel): The invention can be implemented on any Mitel PBX platform supporting PDA (Personal Digital Assistant) Enabled Phone Sets

Third party collaboration or funding: _____

When is the invention scheduled to be first publicly shown or described? Date: TBD _____
City: _____ Country: Canada

Where? Event: _____

Date of first written descriptions and/or drawings of the invention: _____

Where are first written descriptions or drawings kept? David Ross' lab book number 1772
Are first written descriptions and drawings signed and dated? Yes *(If not, please ensure that they are)*

Please provide a clear, complete description of the invention containing as much of the following information as possible - attach an additional sheet(s) to provide the required information.

Please see attached document, "PDA Enabled Set"

Inventor(s) Signatures: (1) (2) (3)

Date: _____

Attachments: Background Information Technical Description Preferred Embodiment

Approved Rejected Date 20

Patent Committee Member Signature
Name: Graham Turner

For approved invention disclosure, priority assigned by Patent Committee Member is Urgent Normal
First Patent Application - Select U.K. U.S. as appropriate. Additional Corresponding Applications - Yes ; if so, countries in
which filings to be made: _____

PDA Enabled Set

1.0 Field of the Invention

This invention relates in general to Computer Telephony Integration (CTI), and more particularly to a system for integrating functionality of a PDA (Personal Digital Assistant) with a telephone set without the aid of a personal computer.

2.0 Background of the Invention

Palm-top or hand held PDAs such as the Palm Pilot or Casio E-10 PDA provide a mobile user with "pocket" applications which are controlled using a pen-based input device, buttons and an LCD output. These devices are enjoying increased popularity because of their lightweight construction and compact design (e.g. the devices can easily fit in a jacket pocket or purse and provide the user with useful features such as contact databases, address books, schedulers, notepads, etc.). Palm-top PCs and PDAs are normally designed to operate as stand alone units, independently of any workstation PC. However, workstation cradles are normally provided for synchronizing the palm-top PC with a workstation. Thus, a user's address books and schedulers in both the palm-top device and the user's desktop computer can be synchronized with each other when changes are made to either device. The cradle consists of a plastic moulded housing for receiving the palm-top PD. The housing contains an integrated power supply and a serial connection to the workstation. Thus, when "docked" in the cradle, the palm-top PDA battery may be charged and the applications running on both the palm-top PDA and workstation may be synchronized over the bi-directional serial link.

Quite independently of the palm-top PDA discussed above, CTI systems are known for integrating telephony features with a PC. For example, the Mitel Personal Assistant integrated telephony system includes a telephone which is connected to a workstation PC via a serial bus or USB, and software for integrating applications running on the desktop PC with telephony features offered by the attached telephone. Thus, for example, the CTI software can be configured so that when an incoming call is received with CLID (Calling Line Identification), a contacts database is accessed and information about the calling party is displayed while the telephone rings. Or, soft keys can be programmed on the telephone, via the computer, to launch an application, such as a spreadsheet.

3.0 Summary of the Invention

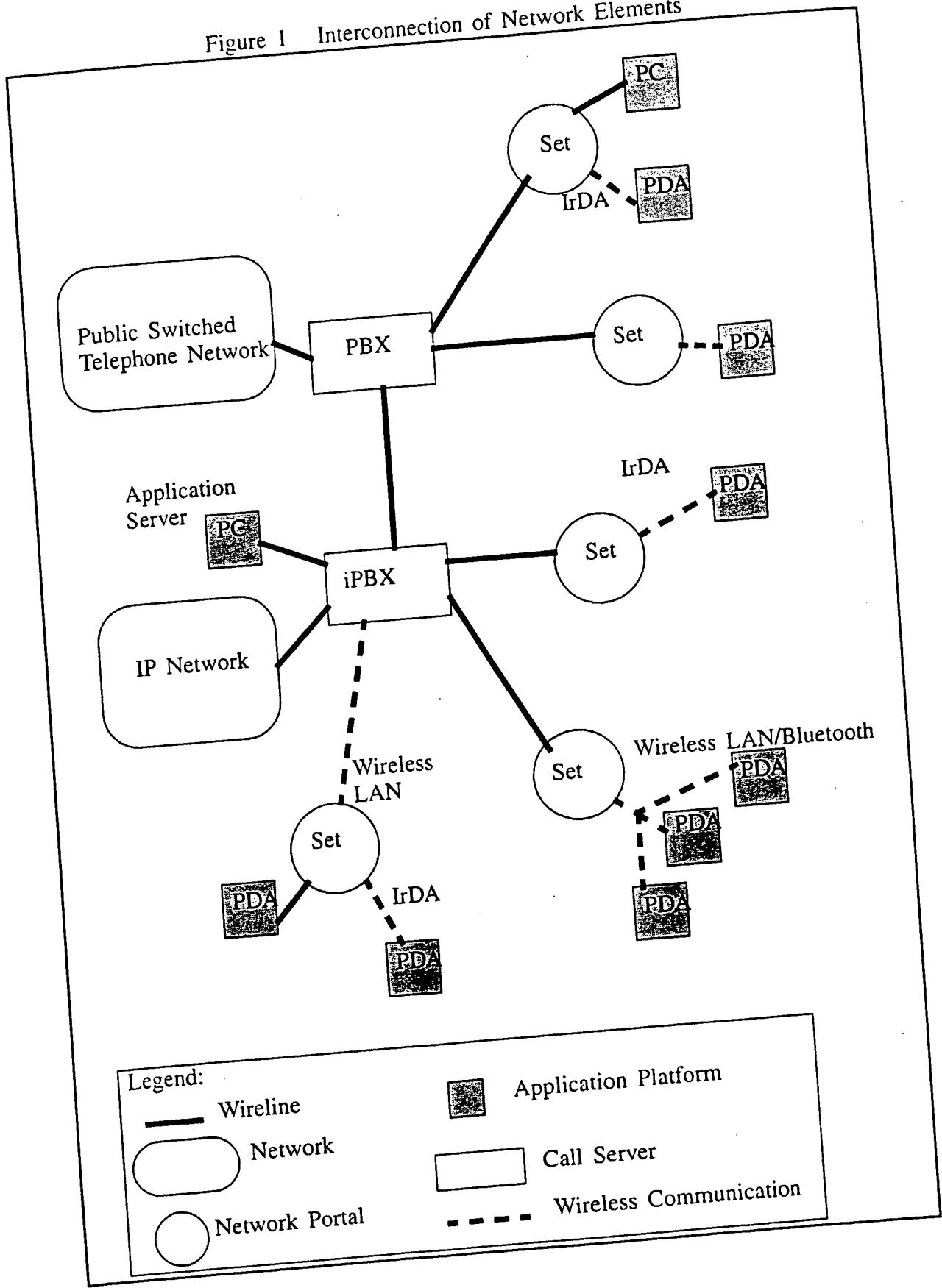
An earlier invention (PDA Dockable Phone, ref:8061-187/SJP) describes the interconnection of a palm-top PDA or computer to a desktop PC which has an attached telephone under its control. This invention is a refinement which does not require the desktop PC to control the operation of the set. By removing the requirement that a desktop PC be present, this invention provides greater mobility to the PDA user by allowing them to control the operation of the phone directly from the PDA. Thus, any PDA Enabled Set can be controlled from applications running on the PDA, not just sets attached to desktop PCs. This configuration is less expensive and more practical for wide deployment than one that requires a PC.

Figure 1 illustrates a network which includes PDA Enabled Sets in a selection of preferred implementations. Each includes the following elements interconnected by a communication protocol:

- Application platform
- Network Portal
- Call Server
- Network

Specifically, this invention deals with software applications executing on PDAs or palm-top computers (the application platform) communicating directly with PDA Enabled Sets (the Network Portal). Note that both TDM (Time Division Multiplexing) and IP (Internet Protocol) communication networks are addressed by the same figure.

Figure 1 Interconnection of Network Elements



The protocols and physical layers between network elements are flexible, however the preferred embodiment uses IrDA, Bluetooth or RS-232 communication between the PDA and the Network Portal (the set). The set is connected to the call server by copper in the case of a PBX based call server or either copper or wireless LAN in the case of IP based call servers such as Mitel's iPBX platform.

The critical difference between this submission and previous inventions is that the telephony application resides directly on the PDA, and, by whatever wired or wireless communications provided between the PDA and the set, data passes from the PDA to the set and vice versa to control functions of the set and hence the call server. Information such as numbers to be called, numbers to be assigned to softkeys, the DN (directory number) of the set, etc. is received by or already stored in the PDA and is used by the PDA application to generate control commands which result in the invocation of a function of the set or call server. The PDA telephony application transfers these commands to the network portal to initiate the telephony feature indicated by the command. Note that the data may originate from an external network, such as the internet, however, processing of the data (e.g. numbers to be called) takes place on the PDA and is subsequently transferred to the set by the PDA application. Similarly, data from the set may be transferred to the PDA to be stored or displayed on the PDA by an application running on the PDA.

In addition, synchronization of PDA databases and applications with a PC or server based database (i.e. Hot Syncing) is a function provided by software running on the network portal (i.e. the set), the PDA, and the PC or server. Note that Hot Syncing is best performed by using a wireline or wireless LAN based communication mechanism between the PDA and the network portal due to the length of time involved.

4.0 Detailed Description of the Preferred Embodiment

Several variations of the physical embodiment of the invention are possible, depending on the type of network involved, either TDM based or IP based.

4.1 TDM Based System

Figure 2 illustrates a possible TDM network configuration involving a PDA, a set and a PBX. In a traditional phone set, dialed digits, feature key presses and other switch features are invoked by the set which creates a switch command for the desired action and transfers the command to the switch. The switch takes action based on the command which might be setting up a call, returning display data to the set or terminating a call.

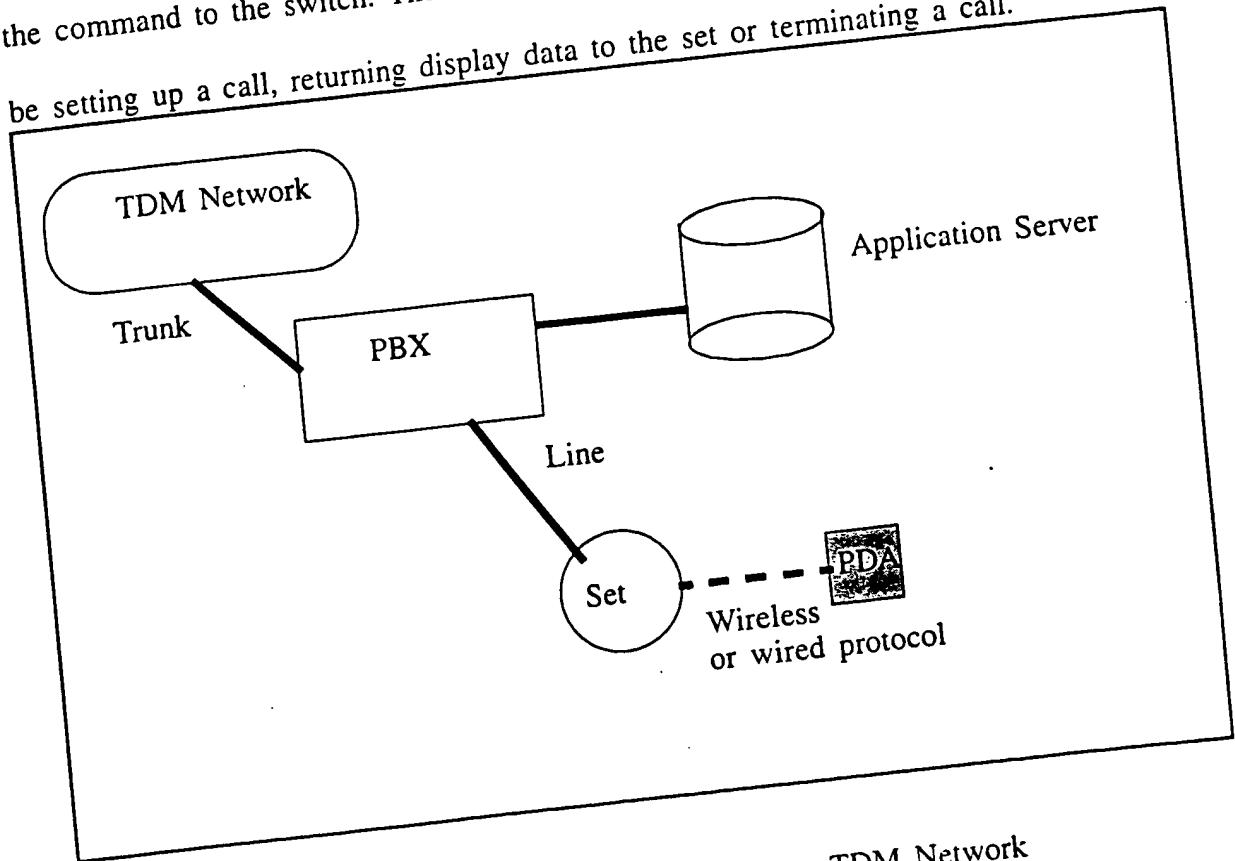


Figure 2 Typical Configuration in a TDM Network

In this invention, the user interface is located on the PDA allowing the user to hold the PDA while selecting items from the display or entering information. With user input cc

lected, the telephony application on the PDA determines which commands should be sent to the PBX for processing and transmits them over an RS-232 serial, USB, Bluetooth or IrDA interface. Any bi-directional serial protocol can be employed, however, the bandwidth must be matched with the amount of data being transferred from the PDA application to the set and vice-versa. Software running in the set may perform some post processing of the commands from the PDA before transferring the command to the switch or PC attached to the set (if present). By placing the call control command generation function in the PDA software, future upgrades to the user interface, call control functions, or other telephony applications can be made by changing the software on the PDA. Changes to software on the set or switch are dramatically reduced and new features can be delivered with a shorter time to market.

A wireless interface between the PDA and the set is preferred for reasons of mobility and ergonomics. Initial implementations include IrDA and Bluetooth interfaces, but other wireless interfaces will follow as they become available.

Software applications for the PDA which use data retrieved from an application server can also be written to download the data from the application server, process it, display it, allow a user to select it, and finally generate a call control command which is transferred to the set and PBX. An example of a distributed application of this type is a PDA application which retrieves directory numbers from a corporate database located on an application server. The PDA displays the retrieved numbers to the user who can then select the desired entry to be dialed. The PDA can then generate the call control command to dial the appropriate digits and send it to the set and PBX. The call control command is specific to the type of PBX, but can be characterized by the type of information it contains.

Currently, the communication mechanism between the PDA and the set is based on either a wired RS-232 solution or IrDA, however a Bluetooth wireless module may also be developed for the set to allow it to act as a network portal for all Bluetooth devices on the desktop.

4.2 IP Based System

In an IP based communication system, illustrated in Figure 3, a PDA can issue call control commands to the set and call server in a manner similar to that described in the previous section. In addition, the PDA can access any node on the IP network directly from the set without having to route data to the call server. Again, the telephony application running on the PDA is responsible for the generation of the call control command which is transferred to the set by wireless or wired means. The software on the set must then determine if the command is destined for the call server or some other node on the IP network based on the

type of message received and imbed the command in an IP packet possessing an address for the desired destination.

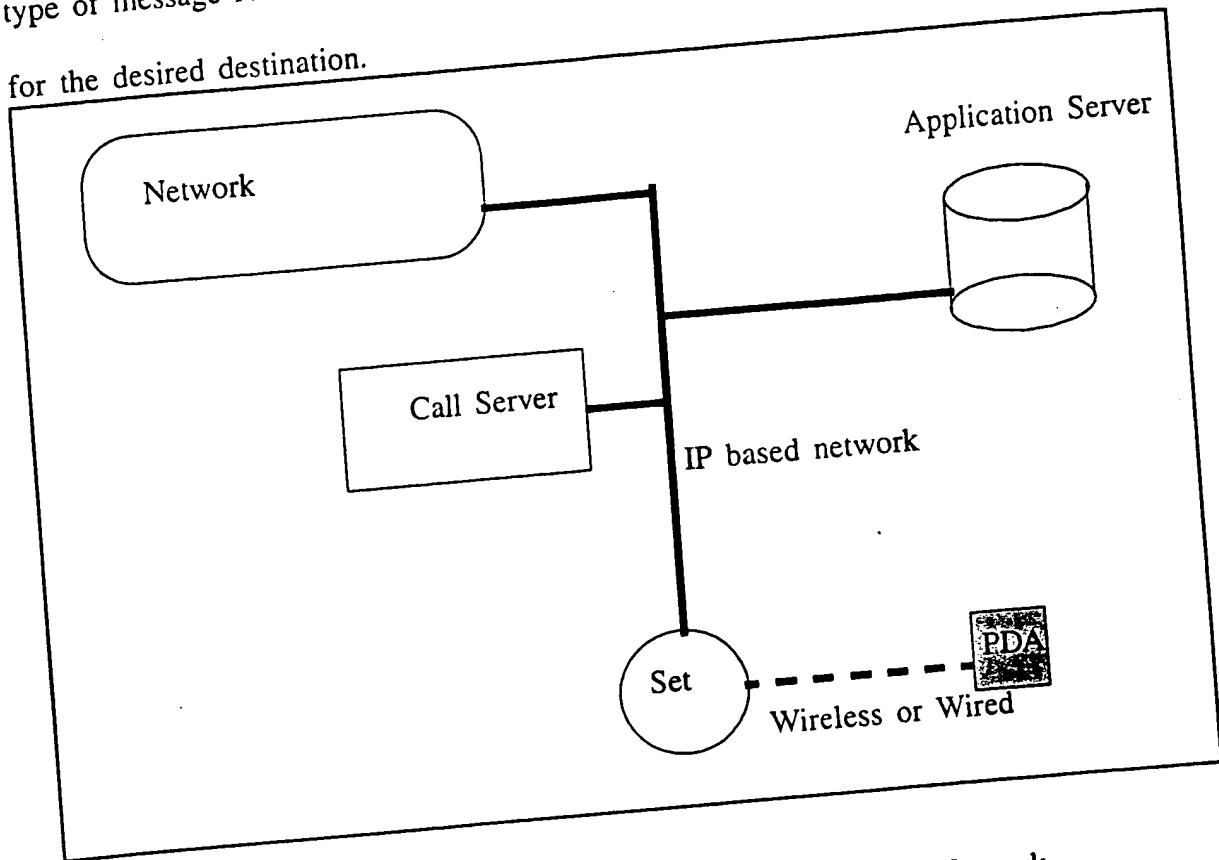


Figure 3 Typical Configuration in an IP Based Network

In addition to applications which transfer call control data, an IP based set can act as a network portal for any application running on the PDA. Thus, PDA functions like software downloads and "hot syncing" of PDA databases to a network database are facilitated by the set. By placing this functionality on the set, the user gains mobility as any PDA

Enabled set in the network can provide connectivity for the PDA.

Currently, the physical embodiment consists of a PDA with an IrDA port providing communication to the set. The data transferred to the set by a PDA application is in the form of a MINET command for call control. The set recognizes that any MINET command, except those beginning with a header byte of value D2, should be sent to the call server. The I

based set imbeds the MINET command in an IP packet with a destination address of the call server. When the call server receives the packet and interprets the MINET command, it takes whatever call control action is indicated by that particular MINET message.

A message originating at the PDA and bound for some other node in the network is received by the set as a MINET message of type D2 with the specific destination IP address given by the first data bytes of the MINET message. Software in the set reads the destination IP address and any other data in the D2 message and forms an IP packet bound for the specified address.

In either case, the source address of the IP message is generated by the set firmware and is distinct from the address of the set. This distinct source address allows the call server or network node to send return packets to the PDA, specifically.

A Bluetooth implementation of the PDA Enabled set is planned which adds a Bluetooth wireless transceiver to the PDA, IP phone and other devices on the wireless desktop. IP access for the PDA is implemented in a manner similar to that already described except that the MINET call control commands are imbedded in IP packets within the PDA & Bluetooth transceiver combination, instead of in the set. The set then acts as a network portal for all Bluetooth devices on the desktop.

Finally, a wired connection using RS-232 is also planned to support PDA applications such as Hot-Sync which do not lend themselves well to a wireless infrared communication mechanism due to the length of time the PDA application expects to be connected to the network. While this scenario is also addressed by the Bluetooth wireless solution between

the set and the PDA, it is expected that the wired solution will see faster development and early introduction to the marketplace.

5.0 Claims

1. A PDA Enabled phone set, comprising:

- A telephone set providing a wired or wireless communication port for a PDA✓
- A PDA application which provides a user interface for call control input for a user. The user interface may be stored locally within the PDA application or downloaded from the phone set or an application server on the network. ↗
- A PDA application that transfers call control information from the PDA application to the phone set
- A phone set which behaves as the network access point for a PDA, including telephony, WML, and 'Hot Sync' data transfers.
- Software and hardware within the phone set to enable communication between the PDA and a remotely located call server, either over a TDM network or an IP based telephony network.
- Software and hardware within the phone set to enable communications between the PDA and a remotely located network node in the case of an IP based set.

[REDACTED] 1/3000

461

Melvin,

I've reviewed this patent
& added my comments to the hardcopy
Jeff is requesting a fair amount of
detail regarding Software architectural
description. I'm leaving this to Jean-Marie
to cover

Ed.

Ed A. comments pg 2,3,10,12

{PLEASE LET ME KNOW HOW, WITH THE EXCEPTION OF THE REMOVAL OF THE PC, THIS DIFFERS FROM THE PDA DOCKABLE PHONE (8061-187). ANY THOUGHTS REGARDING THIS MATTER WILL SERVE TO STRENGTHEN THE APPLICATION.}

5

PDA ENABLED TELEPHONE

Field of the Invention

The present invention relates in general to computer telephony integration (CTI) and more specifically to a personal digital assistant (PDA) enabled telephone.

Background of the Invention

Palm-top or hand-held PDA's such as the Palm Pilot® PC or the Casio® E-10 PDA provide a mobile user with "pocket" applications which are controlled using a pen-based input device, buttons and an LCD output. These devices are enjoying increased popularity because of their lightweight construction and compact design (e.g. the devices can fit easily in a jacket pocket or purse and provide the user with useful features such as contact data bases, address books, schedulers, notepads, etc.).

Quite independently of the palm-top PDAs discussed above, CTI systems are known for integrating telephony features with a PC. For example, the Mitel Personal Assistant® integrated telephony system includes a telephone which is connected to a workstation PC via a serial bus or USB, and software for integrating applications running on the desktop PC with telephony features offered by the attached telephone. Thus, for example, the CTI software can be configured so that when an incoming call is received with CLID (Calling Line Identification), a contacts database is accessed and information about the calling party is displayed while the telephone rings. Or, soft keys can be programmed on the telephone, via the computer, to launch an application on the computer, such as a spreadsheet.

An earlier invention, as described in UK Application No. 9903042.1 to Pinard et al. describes the interconnection of a palm-top PDA or computer to a desktop PC which has an attached telephone under its control. By connecting the PDA to a desktop PC, the PDA user does not have as much mobility since the PDA must be connected to the PC in order to operate the telephone.

Summary of the Invention

The present invention is directed at a PDA enabled telephone which provides mobility to the PDA user by allowing the PDA user to control operation of a telephone set directly from the PDA. By overcoming the necessity of a PC, the PDA user is not required to be at a specific location before using the PDA to dial a telephone number. The PDA controls the telephone set via telephony applications stored within. Moreover, these applications may be downloaded to the PDA for use with the PDA enabled telephone set.

5 The PDA enabled telephone is capable of dialing using a time division multiplexing (TDM) communication network or an Internet protocol (IP) communication network.

10 The protocols and physical layers between network elements of either communication network are flexible, however, USB, IrDA, Bluetooth, RS-232 or a combination of these protocols is preferably used.

15 An advantage of the present invention is that the telephony application resides directly on the PDA. A call command passes from the PDA to the telephone set and vice versa to control functions of the telephone set and hence the call server. Information such as numbers to be called, numbers to be assigned to softkeys, the directory number (DN) of the set, etc. is received by or already stored in the PDA and is used by the telephony application to generate a call control command which results in the invocation of a telephony function on the set or call server. The PDA telephony application transfers this command to the telephone 20 set to initiate the telephony feature indicated by the command. It should be noted that the data may originate from an external network, such as the Internet, however, processing of the data (e.g. numbers to be called) takes place on the PDA and is subsequently transferred to the set by the telephony application. Similarly, data from the telephone set may be transferred to the PDA to be stored or displayed on the PDA by an application running on the PDA.

25 In addition, synchronization of PDA databases and applications with a PC or server based database (i.e. Hot Syncing) is a function provided by software running on the telephone set, the PDA, and the PC or the call server. Hot Syncing is performed by using a wireline or wireless LAN based communication mechanism between the PDA and the telephone set due to the length of time involved.

Brief Description of the Detailed Drawings

30 Embodiments of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 shows a preferred embodiment of a PDA enabled telephone in accordance with the present invention;

5 Figure 2 is a diagram of software modules required for operation of the PDA enabled telephone set {Please provide me with more information regarding the hardware and software to implement the invention within the telephone - Is it similar to the telephone set in 8061-187? } *Missing Fig 2 (JM provided?)*.

Figure 3 is a schematic diagram of a PDA enabled telephone set in accordance with the present invention in a TDM network configuration; and

10 Figure 4 is a schematic diagram of a PDA enabled telephone set in accordance with the present invention in an IP based network.

Detailed Description of Preferred Embodiments

The present invention is directed at a personal digital assistant (PDA) enabled telephone. Turning to Figure 1, a schematic diagram of a PDA enabled telephone in accordance with the present invention is shown.

15 The PDA enabled telephony system 10 comprises a telephone set 12 and a personal digital assistant (PDA) 14. The PDA 14 communicates with the telephone set 12 via a bi-directional serial communication link 15. The communication link may either be a wired connection communication protocol such as an IrDA, USB or RS-232 protocol or a wireless communication protocol such as Bluetooth.

20 The PDA 14 comprises a user interface display 16 as well as a set of buttons 18 for navigation of the PDA 14 by the user. The PDA 14 may also include a writing implement for interacting with the display 16. The telephone set 12 comprises a keypad 20, a pair of control buttons 22 and a port 13 for communicating with the PDA 14.

{INSERT DESCRIPTION OF FIGURE 2}

25 Turning to Figure 3, a TDM communication network is shown. The TDM communication network 101 comprises a TDM network 100, a PBX 102, an application server 104 and the PDA enabled telephony system 10 comprising the telephone set 12 and the PDA 14. The telephony system 10 is connected to the PBX 102 via copper cabling 105. It will be understood that although one telephone is shown, any number of telephones may be included within the TDM communication network 101.

In operation, the user interacts with the PDA 14 to select a telephony function from the display 16. All the telephony functions are located in a telephony application stored

within the PDA 14. It will be understood that this telephony application may be pre-stored within the PDA 14 or downloaded from the application server 104.

An example of a downloadable telephony application is a phone list database which retrieves directory numbers from a corporate database located on the application server 104. The PDA 14 downloads the phone list database from the application server 104 and displays the retrieved numbers on the display 16 to the user who then selects the desired entry to be dialed. Once user input is collected, the telephony application determines the call command to be sent to the PBX 102 and transmits the call command to the PBX via the telephone set 12. The call control command is specific to the type of PBX 102, but can be characterized by the type of information it contains.

It will be understood that although any bi-directional serial communication protocol may be used between the PDA 14 and the telephone set 12, the bandwidth must be matched with the amount of data being transferred from the telephony application to the telephone set 12 and vice-versa. Software {TO BE DESCRIBED IN FIGURE 2} executing on the telephone set 12 may perform post processing of the call command from the PDA 14 before transferring the command to the PBX 102. By placing the call control command generation function within the telephony application stored in the PDA 14, upgrades to the user interface, call control functions etc.. may be achieved by simply updating the telephony application and less updates to software on the telephone set 12 are required. {I REQUIRE MORE INFORMATION CONCERNING THE COMMUNICATION BETWEEN THE PDA AND THE TELEPHONE - IS IT THE SAME AS THE DISCLOSURE IN 8061-187}

Turning to Figure 4, an IP based communication system is shown incorporating a PDA enabled telephone. The IP based communication system 107 comprises an IP network 106, a call server 108, an application server 110 as well as the PDA enabled telephony system 10. The PDA 14 issues a call control command to the telephone set 12 and the call server 108 in a manner similar to that described in Figure 3. In addition, the PDA 14 is capable of accessing any node on the IP network 106 directly from the telephony system 10 without having to route data to the call server 108. Again, the telephony application running on the PDA 14 is responsible for the generation of the call control command transferred to the telephone set 12. The software on the telephone set 12 determines if the command is destined for the call server 108 or a node on the IP network 106. The command is then imbedded in an IP packet containing an address for the desired destination.

In addition to transferring call control data, the IP based PDA enabled telephony system 10 may act as a network portal for any application executing on the PDA 14. Thus, PDA functions such as software downloads and 'Hot syncing' of PDA databases to a network database are facilitated by the telephone set 12. By placing this functionality on the set, the user gains mobility as any PDA enabled telephony system 10 in the network can provide connectivity for the PDA 14. {IN ORDER TO CLAIM THIS ASPECT, I REQUIRE MORE INFORMATION CONCERNING THE DOWNLOADING PROCESS}

For the IP based PDA enabled telephony system 10, the PDA 14 comprises an IrDA port for communicating with the telephone set 12. The data transferred to the telephone set 12 by the telephony application is in the form of a MINET call control command. The telephone set 12 recognizes that any MINET command, except those beginning with a header byte of value D2, are to be sent to the call server 108. The IP based telephony system 10 then imbeds the MINET command in an IP packet with a destination address of the call server 108. When the call server 108 receives the packet and interprets the MINET command, the call server 108 executes the imbedded MINET call command.

A message originating from the PDA 14 and bound for a node in the network 106 is received by the telephone set 12 as a MINET call control command of type D2 with the specific destination IP address given by the first data bytes of the MINET call control command. Software in the telephone set 12 {PLEASE INCLUDE THE SOFTWARE AND HARDWARE FOR BOTH EMBODIMENTS OF THE PDA ENABLED TELEPHONE SET I.E. TDM SET AND THE IP SET} reads the destination IP address and any other data in the D2 message and forms an IP packet bound for the specified address.

In either case, the source address of the IP message is generated by the set 25 firmware and is distinct from the address of the telephone set 12. This distinct source address allows the call server 108 or the addressed node within the IP network 106 to send return packets to the telephone set 12, or PDA 14.

It will be appreciated that, although embodiments of the invention have been described and illustrated in detail, various changes and modifications may be made. Firstly, 30 a Bluetooth implementation of the PDA enabled set may include a wireless transceiver to the PDA, IP phone and other devices on the wireless desktop. IP access for the PDA is implemented in a manner similar to the method described above except that the MINET call control command is imbedded in IP packets within the PDA & Bluetooth transceiver

combination, instead of in the telephone set. The telephone set then acts as a network portal for all Bluetooth devices on the desktop. Another modification is that the PDA enabled telephone set may utilize the RS-232 communication protocol to support PDA applications such as Hot-Sync. Although this scenario is addressed by the Bluetooth wireless solution between the set and the PDA, the wired solution provides for faster development. Also, although only one call command is discussed, it will be understood that a plurality of call commands may be sent from the telephony application to the telephone set. All such changes and modifications may be made without departing from the sphere and scope of the invention as defined by the claims appended herein.

What is Claimed is:

1. A personal digital assistant (PDA) enabled telephony system comprising:
 - 5 a telephone set having a communication port; and
 - a personal digital assistant including
 - 10 a user interface for displaying telephony functions to a user;
 - a detector for detecting a selected telephony function;
 - a telephony application for determining a call command based on said selected telephony function; and
 - 15 a communicator for communicating said call command to said communication port;
 - wherein said telephone set receives said call command and, in response, executes said selected telephony function.
- 15 2. The PDA enabled telephone set of Figure 1 wherein communication between said telephone and said PDA is achieved via at least one of an IrDA, Bluetooth, USB or RS-232 communication protocol.
- 20 3. The PDA enabled telephone set of Figure 1 wherein said telephone comprises:
 - 25 4. The PDA enabled telephone set of Figure 3 wherein said communication between said PDA and said call server is via a TDM or IP based communication network.
 5. The PDA enabled telephone set of Figure 1 wherein said telephone set comprises:
 - 30 6. A network portal comprising:
 - a communication port;
 - network accessing means for retrieving at least one application from a server;
 - communication means for forwarding said at least one application to a PDA via said

communication port.

**{MORE CLAIMS TO FOLLOW I.E. TELEPHONE, USE OF TELEPHONE AS
NETWORK PORTAL ETC...}**

ABSTRACT

The present invention is directed at a Personal digital assistant enabled telephony system. The telephony system comprises a telephone set having a communication port and a personal digital assistant. The personal assistant includes a user interface for displaying telephony functions to a user; a detector for detecting a selected telephony function; a telephony application for determining a call command based on the selected telephony function; and a communicator for communicating said call command to the communication port. In response to receiving the call command, the telephone set executes the selected telephony function.

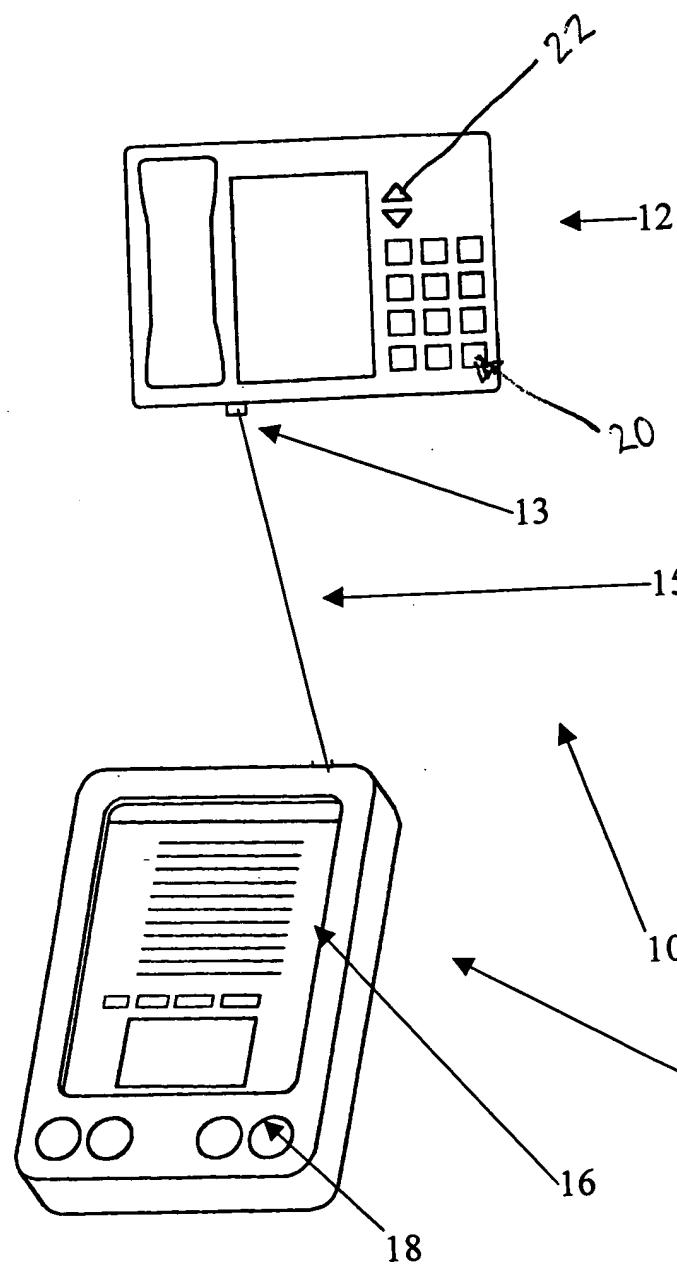


FIGURE 1

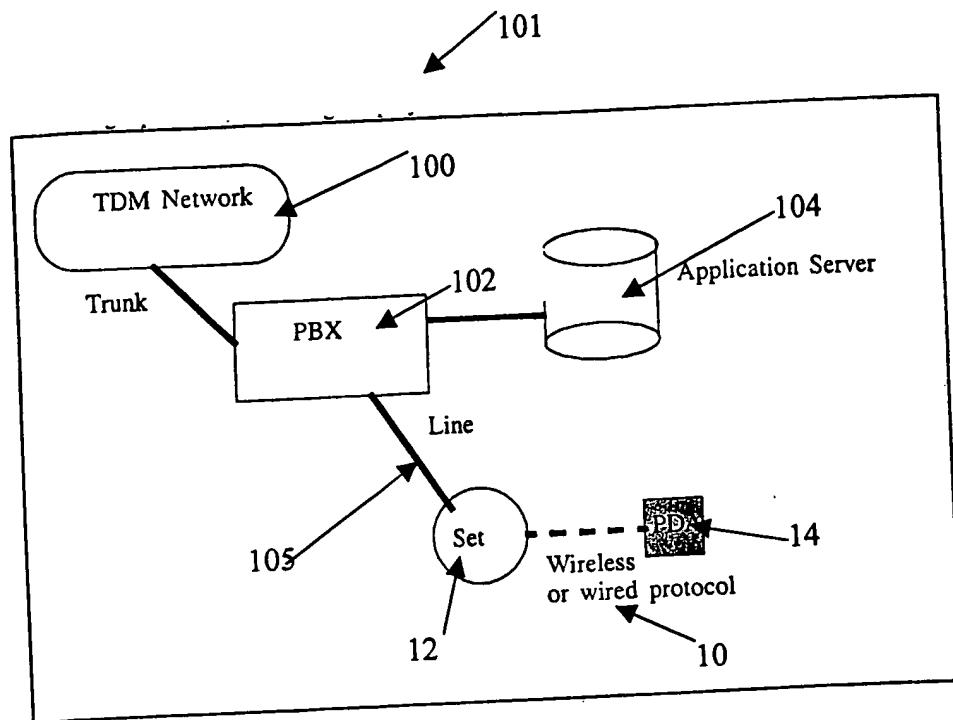


FIGURE 3

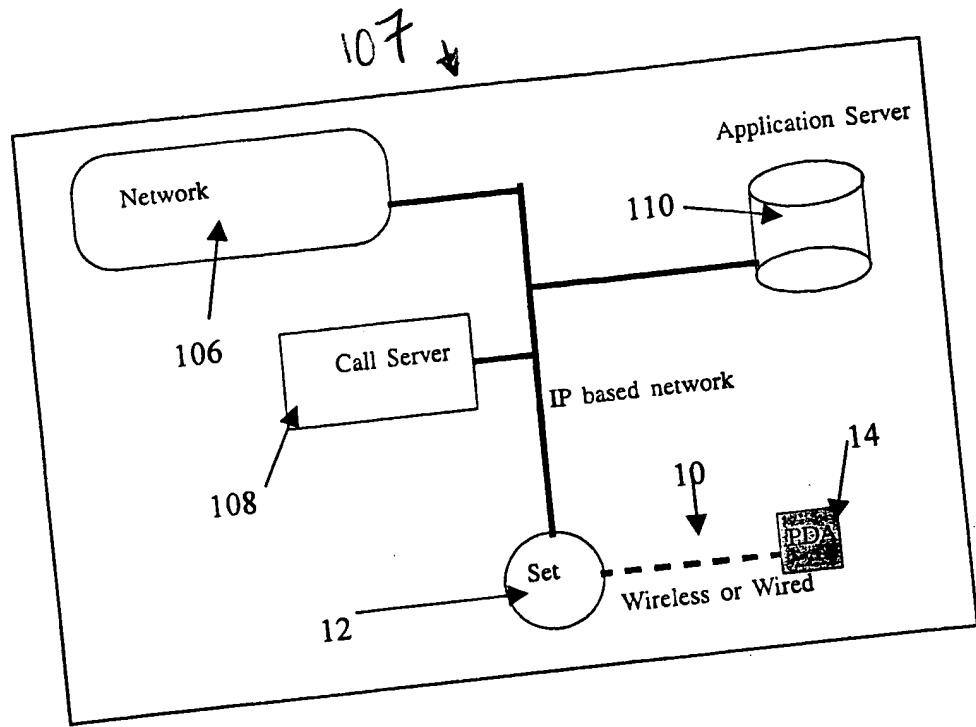


FIGURE 4

RECEIVED

2000

SIM & McBURNEY
SIM, HUGHES, ASHTON & MCKAY

From: Helen Richardson on [REDACTED] 2000 10:10 AM

To: Steve Perry@MitelExternal

cc:

Subject: RE: Mitel #461

8061-433

Hi Steve,
Attached please find the inventor's comments for Mitel #461 - PDA Enabled Set. I am forwarding
additional comments (hard copy) from Ed Gancarcik via courier today.
/helen

----- Forwarded by Helen Richardson/Kan/Mitel on [REDACTED] 2000 10:06 AM -----
"Seguin, JM" <JM_Seguin@Mitel.COM> on [REDACTED] 2000 10:02:50 AM



To: Helen Richardson/Kan/Mitel@Mitel
cc: Ed Gancarcik/Kan/Mitel@Mitel, alain chamsi
Subject: RE: Mitel #461

From my first pass through it would seem that most questions are around the
transport mechanism which we described in the other ID entitled "Transport
Protocols for Application Platforms over Network Portals"

JM

> -----Original Message-----
> From: Helen_Richardson@Mitel.COM [mailto:Helen_Richardson@Mitel.COM]
> Sent: Monday, [REDACTED] 2000 9:24 AM
> To: Ed_Gancarcik@Mitel.COM; david_ross@kanmta01.Mitel.COM;
> alain_chamsi@kanmta01.Mitel.COM; jm_seguin@rnd.Mitel.COM
> Subject: Mitel #461
>
>

> Please review the attached draft patent application and
> return it to me with
> your comments.
> thanks...helen

> ----- Forwarded by Helen
> Richardson/Kan/Mitel on [REDACTED] 2000
> 09:18 AM -----

> From: Steve Perry@MITEEXTERNAL on [REDACTED] 2000 03:31 PM
>
> To: helen_richardson@Mitel
> cc:
>
> Subject: Mitel #461
>

> Hi Helen:

> Here is a first draft prepared by Jeff Wong, for review by Ed
>

> Gancarcik.
>
> Regards
> Steve (See attached file: First draft.doc)
>
>
>
>
>



- First draft2.doc

{PLEASE LET ME KNOW HOW, WITH THE EXCEPTION OF THE REMOVAL
OF THE PC, THIS DIFFERS FROM THE PDA DOCKABLE PHONE (8061-187).
ANY THOUGHTS REGARDING THIS MATTER WILL SERVE TO STRENGTHEN
THE APPLICATION.}

5 {The original ID discusses telephony-related applications only. Where strength can be
added is in the fact that the "network portal" we are discussing in our ID is just that - a
portal to the network for non-telephony applications as well. This could be Oracle,
Remedy, Notes, etc... applications as well as web based applications (WML, XML,
WAP) applications that communicate to a PDA or Laptop using the portal as a
conduit}

10 {After completing my first pass, it became apparent that the ID entitled "Transport
Protocols for Application Platforms over Network Portals" has not been connected to
this application. It contains all details relevant to software and firmware
implementations of data transports over this hardware}

15

PDA ENABLED TELEPHONE

Field of the Invention

20 The present invention relates in general to computer telephony integration
(CTI) and more specifically to a personal digital assistant (PDA) enabled telephone.

Background of the Invention

25 Palm-top or hand-held PDA's such as the Palm Pilot® PC or the Casio® E-10
PDA provide a mobile user with "pocket" applications which are controlled using a pen-
based input device, buttons and an LCD output. These devices are enjoying increased
popularity because of their lightweight construction and compact design (e.g. the devices can
fit easily in a jacket pocket or purse and provide the user with useful features such as contact
data bases, address books, schedulers, notepads, etc.).

30 Quite independently of the palm-top PDAs discussed above, CTI systems are
known for integrating telephony features with a PC. For example, the Mitel Personal
Assistant® integrated telephony system includes a telephone which is connected to a
workstation PC via a serial bus or USB, and software for integrating applications running on

the desktop PC with telephony features offered by the attached telephone. Thus, for example, the CTI software can be configured so that when an incoming call is received with CLID (Calling Line Identification), a contacts database is accessed and information about the calling party is displayed while the telephone rings. Or, soft keys can be programmed on the telephone, via the computer, to launch an application on the computer, such as a spreadsheet.

Summary of the Invention

Summary of the Invention

The present invention is directed at a PDA enabled telephone which provides mobility to the PDA user by allowing the PDA user to control operation of a telephone set directly from the PDA. By overcoming the necessity of a PC, the PDA user is not required to be at a specific location before using the PDA to dial a telephone number. The PDA controls the telephone set via telephony applications stored within. Moreover, these applications may be downloaded to the PDA for use with the PDA enabled telephone set.

be downloaded to the PDA for use with the PDA enabled telephone.

The PDA enabled telephone is capable of dialing using a time division multiplexing (TDM) communication network or an Internet protocol (IP) communication network.

The protocols and physical layers between network elements of either communication network are flexible, however, USB, IrDA, Bluetooth, RS-232 or a combination of these protocols is preferably used.

25 combination of these protocols is preferably used.

An advantage of the present invention is that the telephony application resides directly on the PDA. A call command passes from the PDA to the telephone set and vice versa to control functions of the telephone set and hence the call server. Information such as numbers to be called, numbers to be assigned to softkeys, the directory number (DN) of the set, etc. is received by or already stored in the PDA and is used by the telephony application to generate a call control command which results in the invocation of a telephony function on the set or call server. The PDA telephony application transfers this command to the telephone set to initiate the telephony feature indicated by the command. It should be noted that the data may originate from an external network, such as the Internet, however, processing of the

data (e.g. numbers to be called) takes place on the PDA and is subsequently transferred to the set by the telephony application. Similarly, data from the telephone set may be transferred to the PDA to be stored or displayed on the PDA by an application running on the PDA.

5 In addition, synchronization of PDA databases and applications with a PC or server based database (i.e. Hot Syncing) is a function provided by software running on the telephone set, the PDA, and the PC or the call server.

[My take on this: The telephone set is strictly a portal that redirects calls to the HotSync server or local PC from the PDA onto the network. If the portal is attached to an IP set, this is simply a conversion from serial, USB, IrDA, etc... to TCP/IP. If this is a TDM set, data is kept bundled and conversion must happen at the PBX end before being placed on the network.]

10 Hot Syncing is performed by using a wireline or wireless LAN based communication mechanism between the PDA and the telephone set due to the length of time involved.

Brief Description of the Detailed Drawings

15 Embodiments of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 shows a preferred embodiment of a PDA enabled telephone in accordance with the present invention;

20 Figure 2 is a diagram of software modules required for operation of the PDA enabled telephone set {Please provide me with more information regarding the hardware and software to implement the invention within the telephone – Is it similar to the telephone set in 8061-187? }

[We added all of our detail of the transport mechanism in the associated ID entitled "Transport Protocols for Application Platforms over Network Portals"]

25 Figure 3 is a schematic diagram of a PDA enabled telephone set in accordance with the present invention in a TDM network configuration; and

Figure 4 is a schematic diagram of a PDA enabled telephone set in accordance with the present invention in an IP based network.

30

Detailed Description of Preferred Embodiments

The present invention is directed at a personal digital assistant (PDA) enabled telephone. Turning to Figure 1, a schematic diagram of a PDA enabled telephone in accordance with the present invention is shown.

The PDA enabled telephony system 10 comprises a telephone set 12 and a personal digital assistant (PDA) 14. The PDA 14 communicates with the telephone set 12 via a bi-directional serial communication link 15. The communication link may either be a wired connection communication protocol such as an IrDA, USB or RS-232 protocol or a wireless communication protocol such as Bluetooth.

The PDA 14 comprises a user interface display 16 as well as a set of buttons 18 for navigation of the PDA 14 by the user. The PDA 14 may also include a writing implement for interacting with the display 16. The telephone set 12 comprises a keypad 20, a pair of control buttons 22 and a port 13 for communicating with the PDA 14.

{INSERT DESCRIPTION OF FIGURE 2}

~~[We added all of our detail of the transport mechanism in the associated ID entitled "Transport Protocols for Application Platforms over Network Portals"]~~

Turning to Figure 3, a TDM communication network is shown. The TDM communication network 101 comprises a TDM network 100, a PBX 102, an application server 104 and the PDA enabled telephony system 10 comprising the telephone set 12 and the PDA 14. The telephony system 10 is connected to the PBX 102 via copper cabling 105. It will be understood that although one telephone is shown, any number of telephones may be included within the TDM communication network 101.

In operation, the user interacts with the PDA 14 to select a telephony function from the display 16. All the telephony functions are located in a telephony application stored within the PDA 14. It will be understood that this telephony application may be pre-stored within the PDA 14 or downloaded from the application server 104.

An example of a downloadable telephony application is a phone list database which retrieves directory numbers from a corporate database located on the application server 104. The PDA 14 downloads the phone list database from the application server 104 and displays the retrieved numbers on the display 16 to the user who then selects the desired entry to be dialed. Once user input is collected, the telephony application determines the call command to be sent to the PBX 102 and transmits the call command to the PBX via the telephone set 12. The call control command is specific to the type of PBX 102, but can be characterized by the type of information it contains.

It will be understood that although any bi-directional serial communication protocol may be used between the PDA 14 and the telephone set 12, the bandwidth must be matched with the amount of data being transferred from the telephony application to the telephone set 12 and vice-versa. Software {TO BE DESCRIBED IN FIGURE 2} executing on the telephone set 12 may perform post processing of the call command from the PDA 14 before transferring the command to the PBX 102. By placing the call control command generation function within the telephony application stored in the PDA 14, upgrades to the user interface, call control functions etc.. may be achieved by simply updating the telephony application and less updates to software on the telephone set 12 are required. {I REQUIRE MORE INFORMATION CONCERNING THE COMMUNICATION BETWEEN THE PDA AND THE TELEPHONE - IS IT THE SAME AS THE DISCLOSURE IN 8061-187}

Turning to Figure 4, an IP based communication system is shown incorporating a PDA enabled telephone. The IP based communication system 107 comprises an IP network 106, a call server 108, an application server 110 as well as the PDA enabled telephony system 10. The PDA 14 issues a call control command to the telephone set 12 and the call server 108 in a manner similar to that described in Figure 3. In addition, the PDA 14 is capable of accessing any node on the IP network 106 directly from the telephony system 10 without having to route data to the call server 108. Again, the telephony application running on the PDA 14 is responsible for the generation of the call control command transferred to the telephone set 12. The software on the telephone set 12 determines if the command is destined for the call server 108 or a node on the IP network 106. The command is then imbedded in an IP packet containing an address for the desired destination.

In addition to transferring call control data, the IP based PDA enabled telephony system 10 may act as a network portal for any application executing on the PDA 14. Thus, PDA functions such as software downloads and 'Hot syncing' of PDA databases to a network database are facilitated by the telephone set 12. By placing this functionality on the set, the user gains mobility as any PDA enabled telephony system 10 in the network can provide connectivity for the PDA 14. {IN ORDER TO CLAIM THIS ASPECT, I REQUIRE MORE INFORMATION CONCERNING THE DOWNLOADING PROCESS}

For the IP based PDA enabled telephony system 10, the PDA 14 comprises an IrDA port for communicating with the telephone set 12. The data transferred to the telephone

set 12 by the telephony application is in the form of a MINET call control command. The telephone set 12 recognizes that any MINET command, except those beginning with a header byte of value D2, are to be sent to the call server 108. The IP based telephony system 10 then imbeds the MINET command in an IP packet with a destination address of the call server 108. When the call server 108 receives the packet and interprets the MINET command, the call server 108 executes the imbedded MINET call command.

A message originating from the PDA 14 and bound for a node in the network 106 is received by the telephone set 12 as a MINET call control command of type D2 with the specific destination IP address given by the first data bytes of the MINET call control command. Software in the telephone set 12 {**PLEASE INCLUDE THE SOFTWARE AND HARDWARE FOR BOTH EMBODIMENTS OF THE PDA ENABLED TELEPHONE SET I.E. TDM SET AND THE IP SET**} reads the destination IP address and any other data in the D2 message and forms an IP packet bound for the specified address.

In either case, the source address of the IP message is generated by the set 15 firmware and is distinct from the address of the telephone set 12. This distinct source address allows the call server 108 or the addressed note within the IP network 106 to send return packets to the telephone set 12, or PDA 14.

It will be appreciated that, although embodiments of the invention have been described and illustrated in detail, various changes and modifications may be made. Firstly, 20 a Bluetooth implementation of the PDA enabled set may include a wireless transceiver to the PDA, IP phone and other devices on the wireless desktop. IP access for the PDA is implemented in a manner similar to the method described above except that the MINET call control command is imbedded in IP packets within the PDA & Bluetooth transceiver combination, instead of in the telephone set. The telephone set then acts as a network portal for all Bluetooth devices on the desktop. Another modification is that the PDA enabled 25 telephone set may utilize the RS-232 communication protocol to support PDA applications such as Hot-Sync. Although this scenario is addressed by the Bluetooth wireless solution between the set and the PDA, the wired solution provides for faster development. Also, although only one call command is discussed, it will be understood that a plurality of call 30 commands may be sent from the telephony application to the telephone set. All such changes and modifications may be made without departing from the sphere and scope of the invention as defined by the claims appended herein.

What is Claimed is:

1. A personal digital assistant (PDA) enabled telephony system comprising:
 - 5 a telephone set having a communication port; and
 - a personal digital assistant including
 - 10 a user interface for displaying telephony functions to a user;
 - a detector for detecting a selected telephony function;
 - a telephony application for determining a call command based on said selected telephony function; and
 - 15 a communicator for communicating said call command to said communication port;
 - wherein said telephone set receives said call command and, in response, executes said selected telephony function.
- 15 2. The PDA enabled telephone set of Figure 1 wherein communication between said telephone and said PDA is achieved via at least one of an IrDA, Bluetooth, USB or RS-232 communication protocol.
- 20 3. The PDA enabled telephone set of Figure 1 wherein said telephone comprises:
 - 20 communication means for enabling communication between said PDA and a call server.
4. The PDA enabled telephone set of Figure 3 wherein said communication between said PDA and said call server is via a TDM or IP based communication network.
- 25 5. The PDA enabled telephone set of Figure 1 wherein said telephone set comprises:
 - 25 communication means for enabling communication between said PDA and a network node.
- 30 6. A network portal comprising:
 - a communication port;
 - 30 network accessing means for retrieving at least one application from a server;
 - communication means for forwarding said at least one application to a PDA via said

communication port.

**{MORE CLAIMS TO FOLLOW I.E. TELEPHONE, USE OF TELEPHONE AS
NETWORK PORTAL ETC...}**

ABSTRACT

The present invention is directed at a Personal digital assistant enabled telephony system. The telephony system comprises a telephone set having a communication port and a personal digital assistant. The personal assistant includes a user interface for displaying telephony functions to a user; a detector for detecting a selected telephony function; a telephony application for determining a call command based on the selected telephony function; and a communicator for communicating said call command to the communication port. In response to receiving the call command, the telephone set executes the selected telephony function.

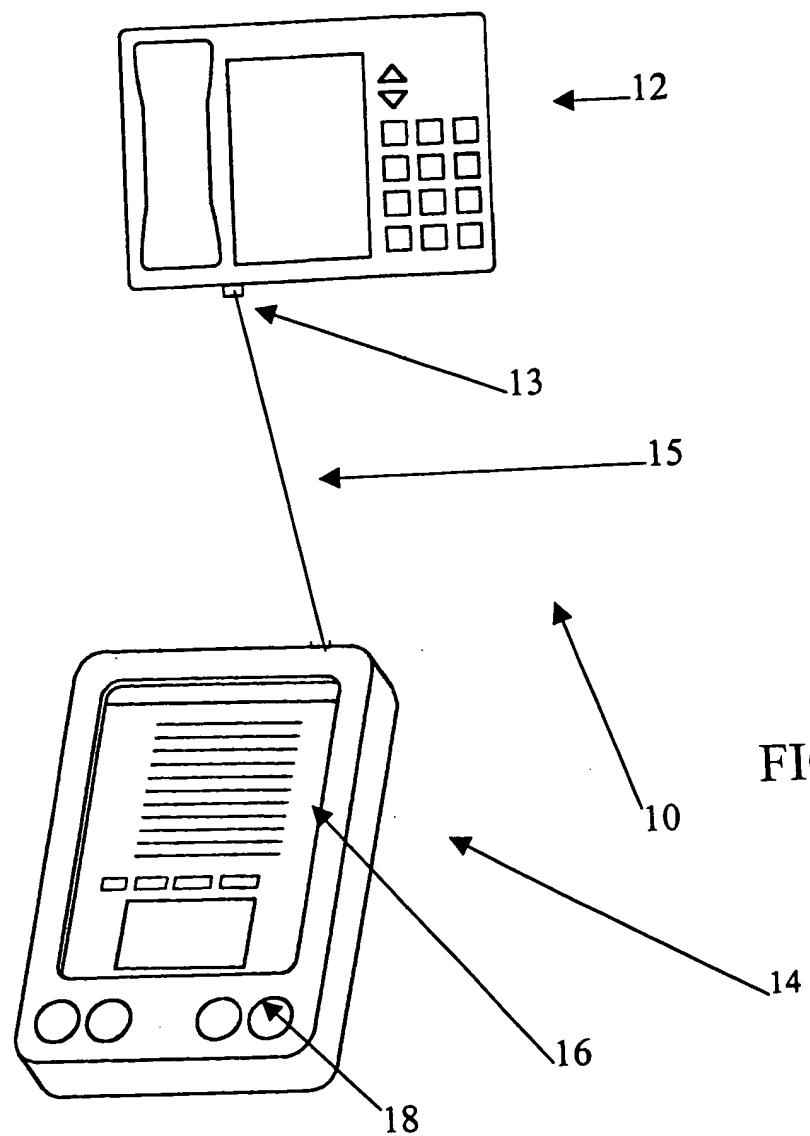


FIGURE 1

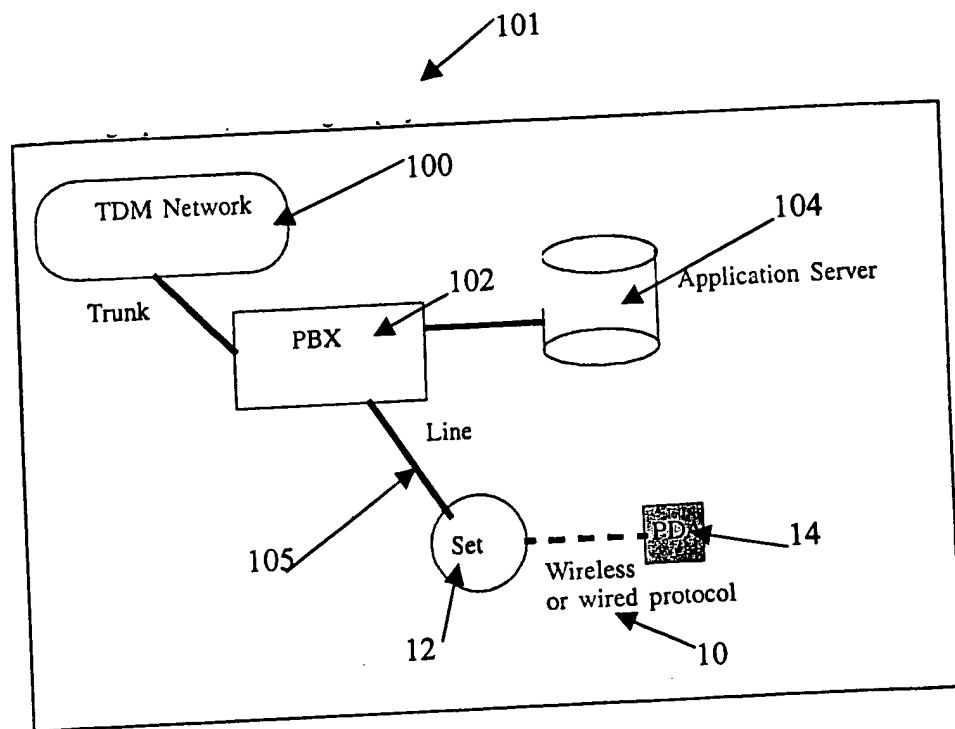


FIGURE 3

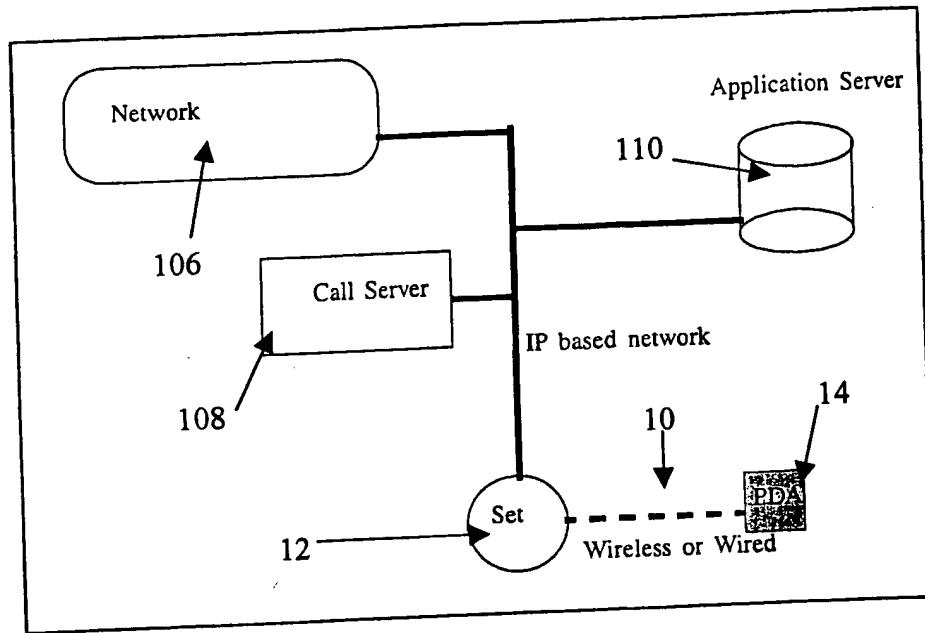


FIGURE 4

1625

#461 Ed. Gancarek

RECEIVED 13 DEC 2000

Comments

PDA ENABLED PHONE

pg 1 line 31

pg 2 line 32

pg 5. line 5 - remove "POTS /Telephony" because POTS
telephony is not physical layer interface

pg 5 line 6 - remove "radio, cellular" and replace
with "Bluetooth."

ALL
DO NOT

PDA ENABLED TELEPHONE

Field of the Invention

5 The present invention relates in general to computer telephony integration (CTI) and more specifically to a personal digital assistant (PDA) enabled telephone.

Background of the Invention

10 Palm-top or hand-held PDA's such as the Palm Pilot® PC or the Casio® E-10 PDA provide a mobile user with "pocket" applications which are controlled using a pen-based input device, buttons and an LCD output. These devices are enjoying increased popularity because of their lightweight construction and compact design (e.g. the devices can fit easily in a jacket pocket or purse and provide useful features such as contact data bases, address books, schedulers, notepads, etc.).

20 Quite independently of the palm-top PDAs discussed above, CTI systems are known for integrating telephony features with a PC. For example, the Mitel Personal Assistant® integrated telephony system includes a telephone which is connected to a workstation PC via a serial bus or USB, and software for integrating applications running on the desktop PC with telephony features offered by the attached telephone. Thus, for example, the CTI software can be configured so that when an incoming call is received with CLID (Calling Line Identification), a contacts database is accessed and information about the calling party is displayed while the telephone rings. Or, soft keys can be programmed on the telephone, via 25 the computer, to launch an application on the computer, such as a spreadsheet.

30 An earlier invention, set forth in UK Application No. 9903042.1 to Pinard et al. describes the interconnection of a palm-top PDA or computer to a desktop PC which has an attached telephone under its control. In order to control telephony features via the PDA, a communication protocol is used between the PDA and PC for exchanging messages and commands. The PC then processes the call ^{Commands} received from the PDA and issues further messages and commands to the telephone using a further protocol which is entirely independent of the protocol used to communicate between the PDA and the PC. This

introduces complexities and costs in implementing PDA enabled telephony.

Summary of the Invention

5 The present invention is directed at a PDA enabled telephone which eliminates the necessity of a PC and allows the PDA user to control operation of a telephone set directly from the PDA. Thus, any PDA enabled set can be controlled by a PDA and the user is not required to be at a specific location before using the PDA to dial a telephone number. The PDA controls the telephone set via telephony applications stored within. Moreover, these
10 applications may be downloaded to the PDA for use with the PDA enabled telephone set.

15 In order to facilitate the foregoing, a simplified protocol is established for communicating between application platforms and network portals (e.g. a PDA and a telephone set, a telephone set and a PC, a PDA and a laptop computer, etc.) This simplified protocol allows for a more standard inter-compatible information exchange between such devices than is provided for by the prior art.

20 An advantage of the present invention is that the telephony application resides directly on the PDA. A call command passes from the PDA to the telephone set and vice versa via the aforesaid protocol to control functions of the telephone set and hence the call server. Information such as numbers to be called, numbers to be assigned to softkeys, the directory number (DN) of the set, etc. is received by or already stored in the PDA and is used by the telephony application to generate a call control command which results in the invocation of a telephony function on the set or call server. The PDA telephony application transfers this
25 command to the telephone set to initiate the telephony feature indicated by the command. It should be noted that the data may originate from an external network, such as the Internet, however, processing of the data (e.g. numbers to be called) takes place on the PDA and is subsequently transferred to the set by the telephony application. Similarly, data from the telephone set may be transferred to the PDA to be stored or displayed on the PDA by an
30 application running on the PDA.

In addition, synchronization of PDA databases and applications with a PC or server based database (i.e. Hot Syncing) is accomplished by communications through the

through

telephone, which functions as a network portal.

Brief Description of the Detailed Drawings

5 Embodiments of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 shows a preferred embodiment of a PDA and PDA enabled telephone in accordance with the present invention;

10 Figure 2 provides at a top portion thereof a block diagram showing a protocol for communications between the PDA and telephone of Figure 1 and at a bottom portion thereof a datagram showing the structure of a packet of information exchanged between the PDA and telephone set of Figure 1;

15 Figure 3 is a block diagram of a PDA enabled telephone set in accordance with the present invention implemented within a TDM network configuration; and

20 Figure 4 is a block diagram of a PDA enabled telephone set in accordance with the present invention implemented within an IP based network.

Detailed Description of Preferred Embodiments

25 The present invention is directed at a personal digital assistant (PDA) enabled telephone. Turning to Figure 1, a schematic illustration is provided of a PDA enabled telephone in accordance with the present invention.

30 The PDA enabled telephony system 10 comprises a telephone set 12 and a personal digital assistant (PDA) 14. The PDA 14 communicates with the telephone set 12 via a bi-directional serial communication link 15. The communication link may either be a wired connection communication protocol such as USB or RS-232 protocol or a wireless communication protocol such as Bluetooth or IrDA.

The PDA 14 comprises a user interface display 16 as well as a set of buttons 18 for navigation of the PDA 14 by the user. The PDA 14 may also include a writing implement for interacting with the display 16. The telephone set 12 may be either an analog set (POTS), digital set, or IP-phone, and is shown comprising a keypad 20, a pair of control buttons 22 and a port 13 for communicating with the PDA 14. The telephone set 12, in turn, 5 communicates with a voice/data network (not shown) such as a PBX, LAN, Wan, etc..

As discussed briefly above, a simplified protocol is provided for communications between the PDA 14 and telephone set 12, without the requirement of an intermediate PC. 10 The details of this protocol are set forth in co-pending U.K. patent application no.

(Mitel ref 459), entitled "TRANSPORT PROTOCOL FOR APPLICATION PLATFORMS COMMUNICATING VIA NETWORK PORTALS". According to the simplified protocol, a diverse collection of voice and data devices may communicate with each other without complicated protocol conversions as exist in the prior art. More 15 specifically, a protocol mechanism is provided for establishing communications between an application platform and a network portal, on the one hand, and between the network portal and a voice/data network, on the other hand.

An application platform, or AP, is any device that can send and receive voice or data, 20 or a mixture of both, between other AP devices through a network portal within a hybrid voice/data network. In other words, an application platform (AP) is any device used as a terminating device on the hybrid network. Examples of application platforms include the PDA 14 which is the subject of the present invention, as well as telephones, cellular phones, wireless communication devices, computers, terminals, laptops, etc. A network portal, or NP, 25 is a device that acts as a common gateway to the voice/data network for application platforms. Examples of network portals include any AP as set forth above that is configured to act as a NP, as well as wireless receivers/transmitters (base stations), etc. In the context of the present invention, the telephone set 12 functions as an NP. The voice/data network itself is a system of voice or data (or a mixture of both) devices connected together for the purpose 30 of transferring or routing voice/data information to other like devices. Examples of a voice/data network include a LAN, WAN, Internet, Intranet, PBX, Centrex, and Wireless Systems.

Turning now to Figure 2, a high level representation is provided of the protocol blocks between the application platform and the network portal, for implementation of the PDA enabled telephone set of the present invention. The lowest layer, or physical layer, is common between both devices and is the mechanism by which information is passed. The 5 physical layer can be a wired interface (serial, parallel, USB, **POTS/telephony**, etc...) or a wireless interface (infrared/IrDA, **radio, cellular, etc...**).

The next layer up, information encapsulation, performs two functions:

1. Takes information from the level above, packaging this information with a header containing necessary source/destination information and hands it over to the physical 10 layer.
2. Takes information from the level below, removing the header containing necessary source/destination information and hands the information up to the higher level.

This level of abstraction allows for a more standard inter-compatible information exchange 15 between devices than is provided for by the prior art.

The top layer is specific to the type of device it resides on. In the situation of an application platform device (e.g. the PDA 14), the Application Specific Interface (ASI), controls the formatting of information for use at the destination. The type of formatting is 20 dependant on destination requirements.

On the NP side of the diagram, a Network Portal Control Interface, or NPCI, determines whether or not the information can be processed internally (e.g. within the telephone set 12 or whether the data should be repackaged for use somewhere within the 25 voice/data network. By having this layer, a NP device is able to process any information which is pertinent to itself rather than always re-transmitting and waiting for another device to return it.

Turning to Figure 3, a TDM communication network is shown. The TDM 30 communication network 101 comprises a TDM network 100, a PBX 102, an application server 104 and the PDA enabled telephony system 10 comprising the telephone set 12 and the PDA 14. The telephony system 10 is connected to the PBX 102 via copper cabling 105. It

will be understood that although one telephone is shown, any number of telephones may be included within the TDM communication network **101**.

5 In operation, the user interacts with the PDA **14** to select a telephony function from the display **16**. All of the telephony functions are located in a telephony application stored within the PDA **14**. It will be understood that this telephony application may be pre-stored within the PDA **14** or downloaded from the application server **104**.

10 An example of a downloadable telephony application is a phone list database which retrieves directory numbers from a corporate database located on the application server **104**. The PDA **14** downloads the phone list database from the application server **104** and displays the retrieved numbers on the display **16** to the user who then selects the desired entry to be dialed. Once the user selection is made, the telephony application determines the call command to be sent to the PBX **102** and transmits the call command to the PBX via the 15 telephone set **12** (i.e. the telephone set **12** functions as a network portal in the above-discussed communications protocol). The call control command is specific to the type of PBX **102**, but can be characterized by the type of information it contains.

20 Alternatively, as discussed above, in the event that the telephony command issued by PDA **14** is capable of implementation within the telephone set **12** (e.g. redial), then the set **12**, acting as a network portal, recognizes the command and implements it without further transmission.

25 It will be understood that although any bi-directional serial communication protocol may be used between the PDA **14** and the telephone set **12**, the bandwidth must be matched with the amount of data being transferred from the telephony application to the telephone set **12** and vice-versa. Software executing on the telephone set **12** performs post processing of the call command from the PDA **14** before transferring the command to the PBX **102**, in accordance with the protocol set forth above. By placing the call control command 30 generation function within the telephony application stored in the PDA **14**, upgrades to the user interface, call control functions etc., may be achieved by simply updating the telephony application.

Turning to Figure 4, an IP based communication system is shown incorporating a PDA enabled telephone. The IP based communication system 107 comprises an IP network 106, a call server 108, an application server 110 as well as the PDA enabled telephony system 10. The PDA 14 issues a call control command to the telephone set 12 and the call server 108 in a manner similar to that described in Figure 3. In addition, the PDA 14 is capable of accessing any node on the IP network 106 directly from the telephony system 10 without having to route data to the call server 108. Again, the telephony application running on the PDA 14 is responsible for the generation of the call control command transferred to the telephone set 12. The software on the telephone set 12 determines if the command is destined for the call server 108 or a node on the IP network 106. The command is then imbedded in an IP packet containing an address for the desired destination, in accordance with the transport protocol set forth in Applicant's co-pending application set forth above.

In addition to transferring call control data, the IP based PDA enabled telephony system 10 may act as a network portal for any application executing on the PDA 14. Thus, PDA functions such as software downloads and 'Hot syncing' of PDA databases to a network database are facilitated by the telephone set 12. By placing this functionality on the set, the user gains mobility as any PDA enabled telephony system 10 in the network can provide connectivity for the PDA 14.

For the IP based PDA enabled telephony system 10, the PDA 14 comprises an IrDA port for communicating with the telephone set 12. The data transferred to the telephone set 12 by the telephony application is in the form of a MINET call control command. MINET is a proprietary call control protocol developed by Mitel Corporation. The telephone set 12 recognizes that any MINET command, except those beginning with a header byte of value D2, are to be sent to the call server 108. The IP based telephony system 10 then embeds the MINET command in an IP packet with a destination address for the call server 108. When the call server 108 receives the packet and interprets the MINET command, the call server 108 executes the embedded MINET call command.

A message originating from the PDA 14 and bound for a node in the network 106 is received by the telephone set 12 as a MINET call control command of type D2 with the specific destination IP address given by the first data bytes of the MINET call control

command. As discussed above, the protocol implementing software in the telephone set **12** reads the destination IP address and any other data in the D2 message and forms an IP packet bound for the specified address.

5 In either case, the source address of the IP message is generated by the set firmware and is distinct from the address of the telephone set **12**. This distinct source address allows the call server **108** or the addressed node within the IP network **106** to send return packets to the telephone set **12**, or PDA **14**.

10 It will be appreciated that, although embodiments of the invention have been described and illustrated in detail, various changes and modifications may be made. Firstly, a Bluetooth implementation of the PDA enabled set may include a wireless transceiver to the PDA, IP phone and other devices on the wireless desktop. IP access for the PDA is implemented in a manner similar to the method described above except that the MINET call 15 control commands are embedded in IP packets within the PDA & Bluetooth transceiver combination, instead of in the telephone set. The telephone set then acts as a network portal for all Bluetooth devices on the desktop. Another modification is that the PDA enabled telephone set may utilize the RS-232 communication protocol to support PDA applications such as Hot-Sync. Although this scenario is addressed by the Bluetooth wireless solution 20 between the set and the PDA, the wired solution provides for faster development. Also, although only one call command is discussed, it will be understood that a plurality of call commands may be sent from the telephony application to the telephone set. All such changes and modifications may be made without departing from the sphere and scope of the invention as defined by the claims appended herein.

What is Claimed is:

1. A personal digital assistant (PDA) enabled telephony system comprising:
 - a telephone set having a communication port; and
 - 5 a PDA having a user interface for displaying telephony functions to a user, a detector for detecting a selected telephony function, a telephony application for determining a call command based on said selected telephony function, and a communicator for communicating said call command to said communication port;
 - 10 wherein said telephone set receives said call command and, in response, executes said selected telephony function.
2. The PDA enabled telephony system of claim 1 wherein communication between said telephone set and said PDA is achieved via a protocol implemented via software within each of said telephone set and said PDA.
- 15 3. The PDA enabled telephony system of claim 2, wherein said protocol as implemented within said PDA comprises a physical layer for exchanging said call command between said PDA and said telephone set, an application specific interface for formatting said call command for use by said PDA, and a first information encapsulation layer for appending source/destination headers to said call command received from said application specific interface and transmitting same over said physical layer to said telephone set.
- 20 4. The PDA enabled telephony system of claim 3, wherein said protocol as implemented within said telephone set comprises said physical layer, a network portal control interface for detecting whether said call command is capable of processing directly within said telephone set and otherwise re-transmits said call command, and a second information encapsulation layer for appending source/destination headers to said call command received from said network portal control interface and transmitting same over said physical layer.
- 25 30 at least one of an IrDA, Bluetooth, USB or RS-232 communication protocol.
5. The PDA enabled telephony system of claim 1 wherein said telephone set includes communication means for enabling communication between said PDA and a call server.

6. The PDA enabled telephony system of claim 3 wherein said communication between said PDA and said call server is via one of either a TDM or IP based communication network.

5

7. The PDA enabled telephony system of claim 1 wherein said telephone set includes communication means for enabling communication between said PDA and a network node.

8. The PDA enabled telephony system according to any one of the foregoing claims, wherein said physical layer comprises at least one of a wired interface or wireless interface.

9. The PDA enabled telephony system according to claim 8, wherein said wired interface comprises at least one of a serial interface, parallel interface, USB interface, tip and ring interface.

15

10. The PDA enabled telephony system according to claim 8, wherein said wireless interface comprises at least one of an infrared/IrDA interface, radio interface, and cellular interface.

ABSTRACT

A personal digital assistant (PDA) enabled telephony system is provided comprising a telephone set having a communication port and a personal digital assistant. The personal 5 assistant includes a user interface for displaying telephony functions to a user; a detector for detecting a selected telephony function; a telephony application for determining a call command based on the selected telephony function; and a communicator for communicating said call command to the communication port. In response to receiving the call command, the telephone set executes the selected telephony function.

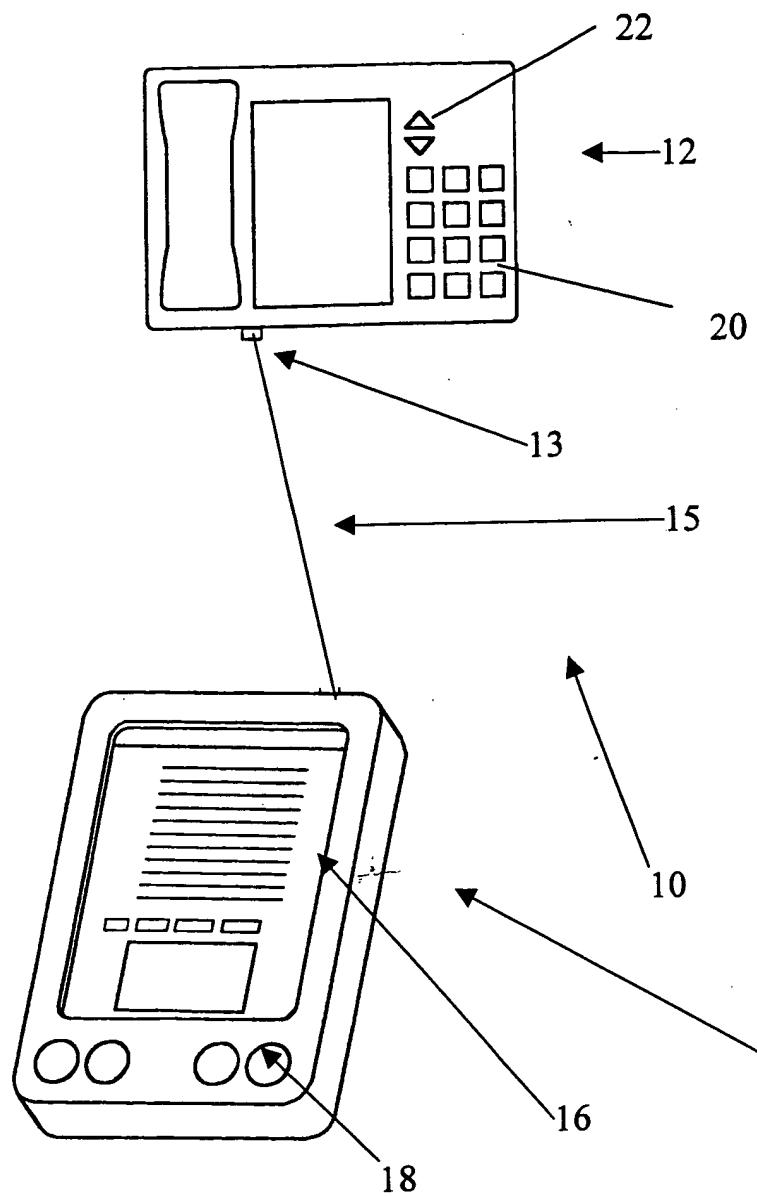


FIGURE 1



*Application
Platform*

*Network
Portal*

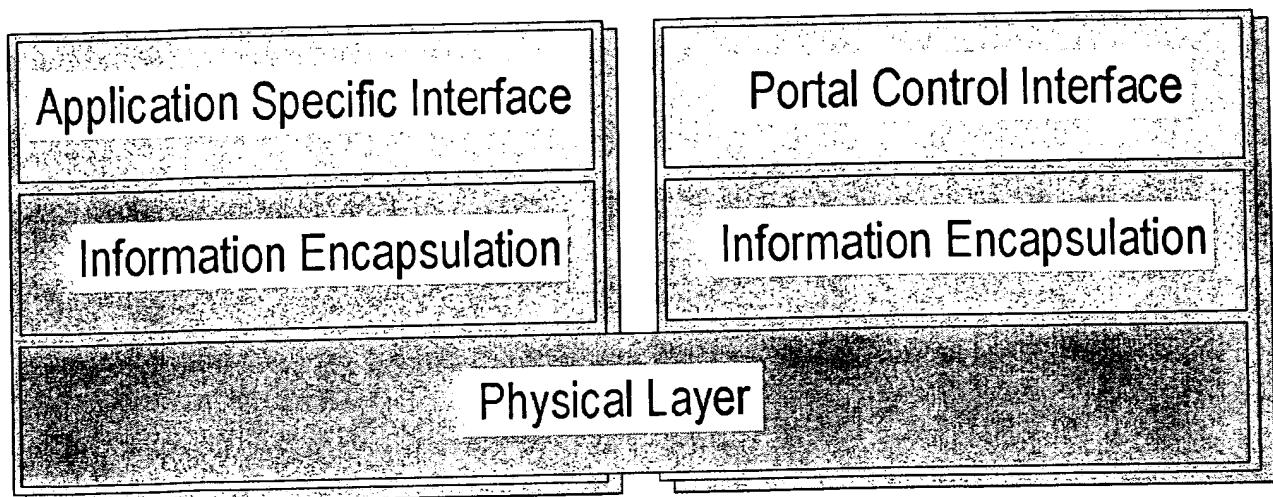


FIGURE 2

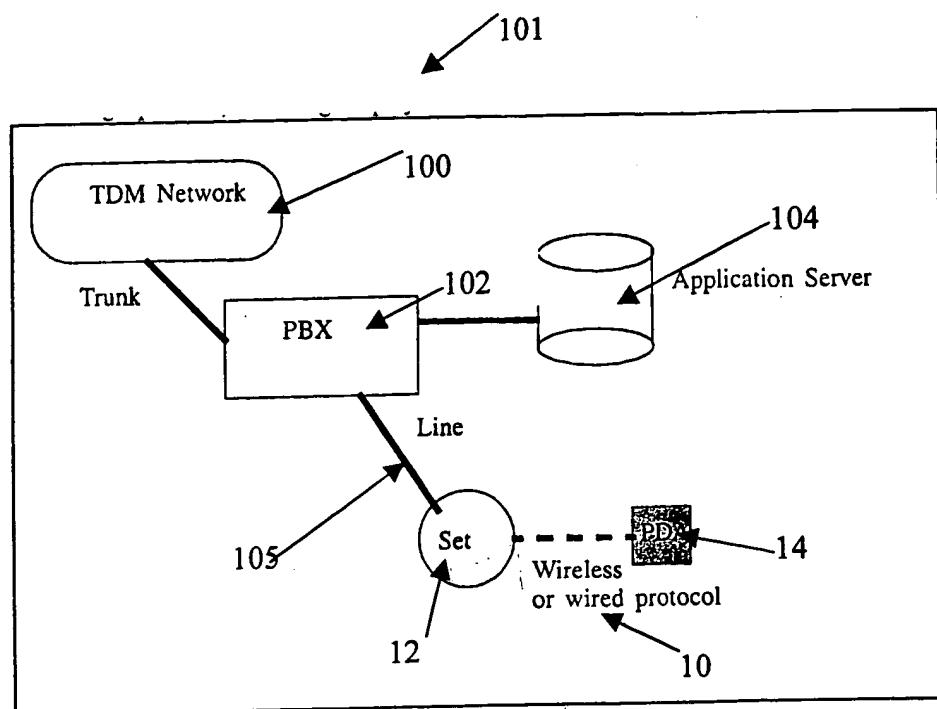


FIGURE 3

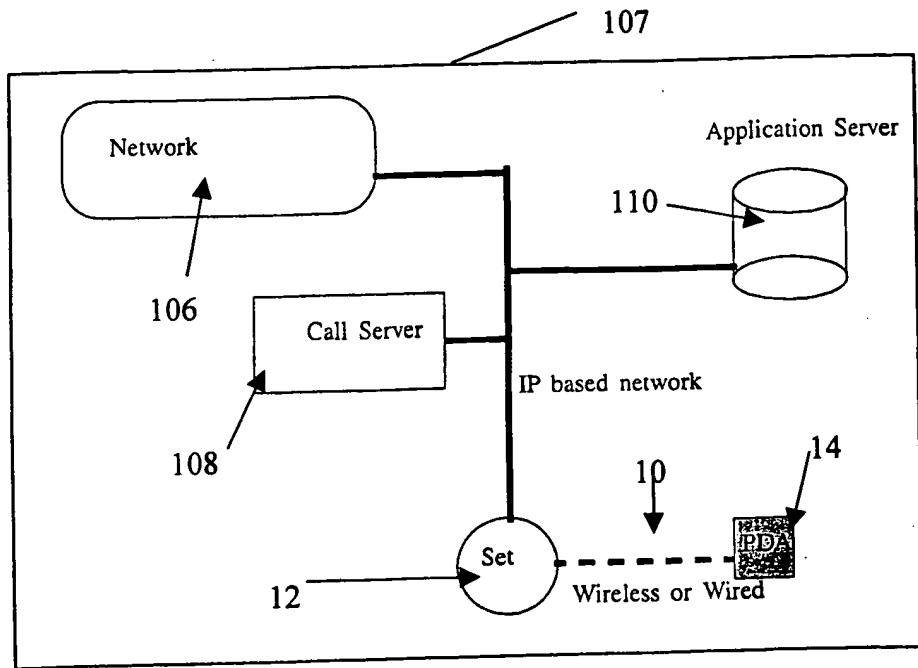


FIGURE 4

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